#### ENERGY ENGINEERING ANALYSIS PROGRAM

FORT GEORGE G. MEADE MARYLAND

FINAL REPORT NOVEMBER 28, 1986

VOLUME 1
EXECUTIVE SUMMARY

CONTRACT NO. DACA 31-82-C-0307 DEPARTMENT OF THE ARMY BALTIMORE DISTRICT CORPS OF ENGINEERS

19971016 036

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#### EXECUTIVE SUMMARY

#### 1. INTRODUCTION

#### <u>Purpose</u>

The Army Energy Plan, established in early 1978, sets both short and long term energy goals for the Army consistent with the Presidential Executive Order 12003 issued in mid-1977. It directs the Major Army commands to develop detailed implementation plans and funding documents.

The National Energy Conservation Policy Act (NECPA) of 1978, directs that all facilities owned and operated by a Federal Agency must have all energy conservation retrofits performed by 1 January 1990.

The Department of the Army, through the Corps of Engineers Baltimore, has contracted with Ewing Cole Cherry Parsky to provide the Energy Engineering Analysis Program (EEAP) at Fort George G. Meade under contract number DACA31-82-C-0307. The results of the study are indicated in detail in the MAIN REPORT, Volume 2B of the Report. Back-up calculations are provided in Volume 4B of the Report.

The purpose of this EXECUTIVE SUMMARY is to summarize the results of the EEAP.

#### Scope of Work

The increments of work to be provided as stated in the Contract are:

- Increment A: Energy Conservation Investigations for Buildings and Processes. The Facilities Engineering Office at Fort Meade indicated that they would rather have specific information for a selected group of buildings rather than extrapolated information which they do not believe will be useful to them because of the considerable amount of work that they have already done and are planning to do. As a consequence, with the exception of certain housing and barracks buildings which can be extrapolated, the buildings selected by Fort Meade for study are atypical, and limit the extent of the analysis.
- Increment B: Energy Conservation Investigations of Utilities and energy Distribution Systems, Energy Monitoring and Control Systems (EMCS), and Local Use of Available Waste Fuels in Existing Energy Plants. By Contract, the EMCS analysis for Increment B is limited to a general review of the problems with the existing system and an expression of Ewing Cole Cherry Parsky's opinion on what should be done with existing systems.

- Increment C: Renewable Energy Projects. By Contract, Increment C is limited to solar studies only. Solar studies are not to include space heating or cooling.
- Increment F: Facilities Engineering Conservation Measures
- Increment G: Projects Identified in Increments A & B That Do Not

  Qualify Under ECIP Criteria

#### 2. EXISTING ENERGY CONSUMPTION

There are a number of factors which affect the development and presentation of historical and projected energy consumption data for the contract. These include:

- 1. The energy consumption values and areas indicated in the "Installation Facility Energy Plan" do not include the consumption for the NSA buildings and the County Schools, since NSA and the schools are not considered to be part of the "Fort Meade" facilities, but do include consumption and area at Support Activities under the control of Fort Meade at other locations and at 15 U.S. Army Reserve (USAR) Centers. The utility company gas and electric bills for Fort Meade include the separately metered but not separately billed consumption of NSA and the schools.
- The work under the contract does not include the Support Activities or the USAR Centers under the control of Fort Meade, but does include 4 NSA buildings (P-9801, P-9827, P-9828 and P-9829).
- 3. With the selection of atypical buildings, building group and typical building energy consumption is not available.

On the basis of discussions with the Department of the Army, Baltimore District, Corps of Engineers, the historical energy consumption shown in this report is the consumption at Fort Meade exclusive of the consumption

for the NSA buildings and the County Schools and exclusive of the consumption for the Support Activities and USAR Centers under the control of Fort Meade. As a consequence, the values indicated do not agree with the "Installation Facility Energy Plan" and also do not include consumption or cost for the individual NSA buildings in the contract, since this latter information is not available.

Additionally, on the basis of discussion with the Department of the Army, Baltimore District, Corps of Engineers, projections of energy consumption and savings resulting from implementation of the recommendations of this report are broken down into two parts. The first part includes all buildings and extrapolations exclusive of the 9800 series (NSA) buildings. The second part covers the 9800 series NSA buildings and extrapolations and provides information of projected savings only, without comparison to historical data, since the latter information is not available for these buildings.

The following tables and figures are based on the previous discussion.

Table 2.1 lists the energy conversion factors for converting fuel consumption units to BTU and MBTU for the purpose of calculating energy savings. This listing is copied from "Energy Conservation Investment Program (ECIP) Guidance", revised 6 August 1983, page 2, paragraph 3a.

Tables 2.2 through 2.9 show the consumption values in fuel units, MBTU and cost for fuels used at Fort Meade for fiscal years 1975, 1980, 1981 and 1982.

Tables 2.10 through 2.13 and their "pies" show the total base-wide facility energy values based on data from Tables 2.2 through 2.4 for fiscal years 1975, 1980, 1981 and 1982.

Table 2.14 compares the base-wide facility energy values for fiscal years 1975, 1980, 1981 and 1982 based on information obtained from Tables 2.2 through 2.4. It indicates an overall reduction of more than 18% in facility energy consumption for FY82 compared to FY75.

Figures 2-1, 2-2 and 2-3 show graphically the monthly consumption of electricity, natural gas and oil for fiscal years 1975, 1980, 1981 and 1982.

#### 2.1 ENERGY CONVERSION FACTORS

FUEL	FUEL	_ UNIT	CONVERSION FACTOR IN BTU	CONVERSION IN ME	
ELECTRICITY NATURAL GAS NATURAL GAS NO. 2 FUEL PROPANE GASOLINE NO. 2 DIESE AVGAS, JP-4	S S S S S S S S S S S S S S S S S S S	KWH THERM CCF. GAL. GAL. GAL.	11,600 BTU/KWH 100,000 BTU/THERM 103,100 BTU/CCF. 138,700 BTU/GAL. 95,000 BTU/GAL. 149,700 BTU/GAL. 149,700 BTU/GAL.	0.1031 M 0.1387 M 0.0955 M 0.1497 M	BTU/THERM BTU/CCF. BTU/GAL.
2.2 ELECTR	ICITY				
FISCAL YEAR	ANNUAL CONSUMPTION KWH	ANNUAL CONSUMPTIO MBTU	PERCENTAGE OF USE 1975	ANNUAL ELECTRIC COST\$	PERCENTAGE OF COST 1975
1975 1980 1981 1982	75,490,399 78,863,922 79,586,097 79,493,160	875,689 914,821 923,199 922,121	100% 104.5 105.4 105.3	* 2,622,468 2,820,639 3,189,020	100% * * *
2.3 <u>NATURA</u>	_ GAS			٠	
FISCAL YEAR	ANNUAL CONSUMPTION CCF	ANNUAL CONSUMPTIO MBTU	PERCENTAGE N OF USE 1975	ANNUAL GAS COST S	PERCENTAGE OF COST 1975
1975 1980 1981 1982	7,794,474 5,798,668 5,996,161 6,055,612	803,920 597,843 618,204 624,333	100% 74.4 76.9 79.0	* 1,808,358 2,242,716 2,861,319	100% * * *
2.4 <u>NO. 2 I</u>	FUEL OIL				
FISCAL YEAR	ANNUAL CONSUMPTION GAL.	ANNUAL CONSUMPTIO MBTU	PERCENTAGE OF USE 1975	ANNUAL OIL COST S	PERCENTAGE OF COST 1975
1975 1980	5,070,264 2,842,834	703,246 394,301	100% 53.7	*	100%

1981

1982

3,042,367

2,889,255

421,976 400,739

57.4

54.5

4,168,042

\*

<sup>\*</sup>Information not available.

2.	5	PROPANE
	_	

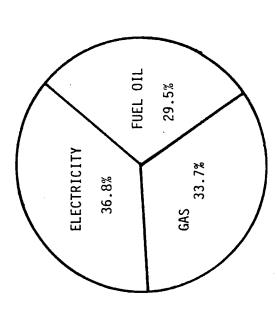
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	FISCAL YEAR	ANNUAL CONSUMPTION GAL.	ANNUAL CONSUMPTION MBTU	PERCENTAGE USE OF 1975	ANNUAL PROPANE COST S	PERCENTAGE OF COST 1975
	1975 1980 1981 1982	21,442 10,253 26,368 8,631	2,037 974 2,505 820	100% 47.8 123.0 40.3	* * *	100% * * *
2.6	MOBILITY	GASOL INE				
	FISCAL YEAR	ANNUAL CONSUMPTION GAL.	ANNUAL CONSUMPTION MBTU	PERCENTAGE USE OF 1975	ANNUAL GASOLINE COST \$	PERCENTAGE OF COST 1975
	1975 1980 1981 1982	684,115 649,519 605,671 565,591	102,412 97,233 90,669 84,669	100% 94.9 88.5 82.7	* * *	100% * * *
2.7	MOBILITY	DIESEL OIL				
	FISCAL YEAR	ANNUAL CONSUMPTION GAL.	ANNUAL CONSUMPTION MBTU	PERCENTAGE USE OF 1975	ANNUAL DIESEL COST S	PERCENTAGE OF COST 1975
	1975 1980 1981 1982	361,910 267,348 250,822 286,266	54,178 40,022 37,548 42,854	100% 73.4 69.3 79.1	* * *	100% * * *
2.8	MOBILITY	AVGAS				
	FISCAL YEAR	ANNUAL CONSUMPTION GAL.	ANNUAL CONSUMPTION MBTU	PERCENTAGE USE OF 1975	ANNUAL AVGAS COST S	PERCENTAGE OF COST 1975
	1975 1980 1981 1982	* * * *	7,318 2,691 1,783 2,850	100% 36.8 24.4 38.9	* * *	100% * * *
2.9	MOBILITY .	JP- 4				
	FISCAL YEAR	ANNUAL CONSUMPTION GAL.	ANNUAL CONSUMPTION MBTU	PERCENTAGE USE OF 1975	ANNUAL JP-4 COST S	PERCENTAGE OF COST 1975
	1975 1980 1981 1982	* * *	69,086 47,808 49,873 41,418	100% 69.2 72.2 60.0	* * *	100% * * *

<sup>\*</sup>Information not available.

2.10 ENERGY CONSUMPTION, COST AND PERCENTAGES BY FUEL TYPE, FY1975

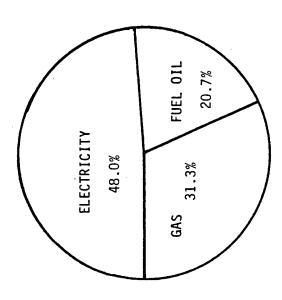
FUEL TYPE	CONSUMPTION IN FUEL UNITS	CONSUMPTION IN SOURCE MBTU	% OF TOTAL CONSUMPTION	\$ ENERGY COST	% OF TOTAL COST
Electricity Natural Gas No. 2 Fuel Oil	75,450,399 KWH 7,794,474 CCF 5,070,264 GAL	875,689 803,920 703,246	36.8 33.7 29.5	* * *	* * *
Total-Facilities		2,382,855	100.0		

Total



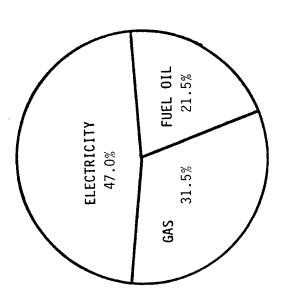
\*Information not available.

/8,803,922 KWH 5,798,668 CCF



\*Information not available.

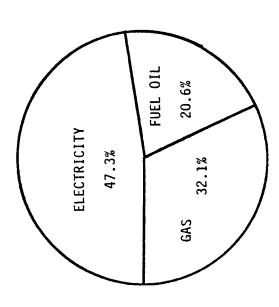
FUEL TYPE	CONSUMPTION IN FUEL UNITS	CONSUMPTION IN SOURCE MBTU	% OF TOTAL	\$ ENERGY COST	% OF TOTAL COST
Electricity Natural Gas No. 2 Fuel Oil	79,586,097 KWH 5,996,161 CCF 3,042,367 GAL	923,199 618,204 421,976	47.0 31.5 21.5	2,820,639 2,242,716 4,168,042	* * *
Total-Facilities		1,963,379	100.0		



\*Information not available.

2.13 ENERGY CONSUMPTION, COST AND PERCENTAGES BY FUEL TYPE, FY1982

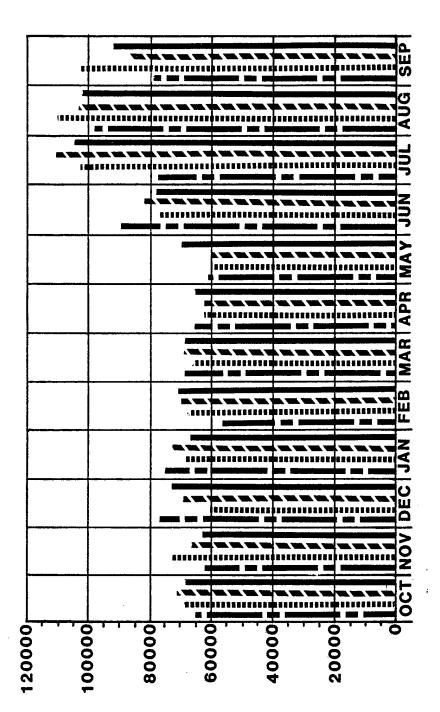
FUEL TYPE	CONSUMPTION IN FUEL UNITS	CONSUMPTION IN SOURCE MBTU	% OF TOTAL CONSUMPTION	\$ ENERGY COST	% OF TOTAL COST
Electricity Natural Gas No. 2 Fuel Oil	79,493,160 KWH 6,055,612 CCF 2,889,255 GAL	922,121 624,333 400,739	47.3 32.1 20.6	3,189,020 2,861,319 *	* * *
Total-Facilities		1,947,193	100.0		



\*Information not available.

# 2.14 ANNUAL TOTAL COMPARISON

FISCAL YEAR	FACILITIES ANNUAL ENERGY MBTU/YR	FACILITIES USE % OF 1975
1975	2,382,855	100.0
1980	1,906,965	80.0
1981	1,963,379	82.4
1982	1,947,193	81.7



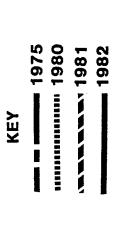


FIGURE 2-1 MONTHLY ELECTRICAL ENERGY USAGE FY35 FY80 FY81 FY82

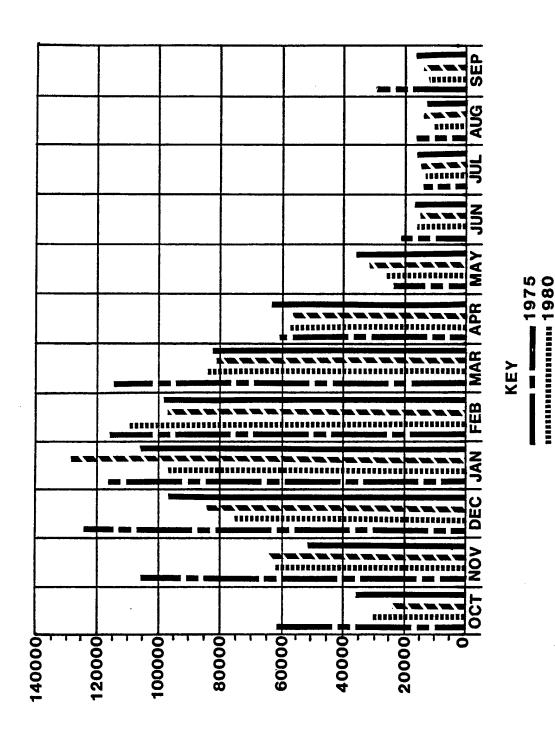


FIGURE 2-2 MONTHLY GAS ENERGY USAGE FY75 FY80 FY81 FY82

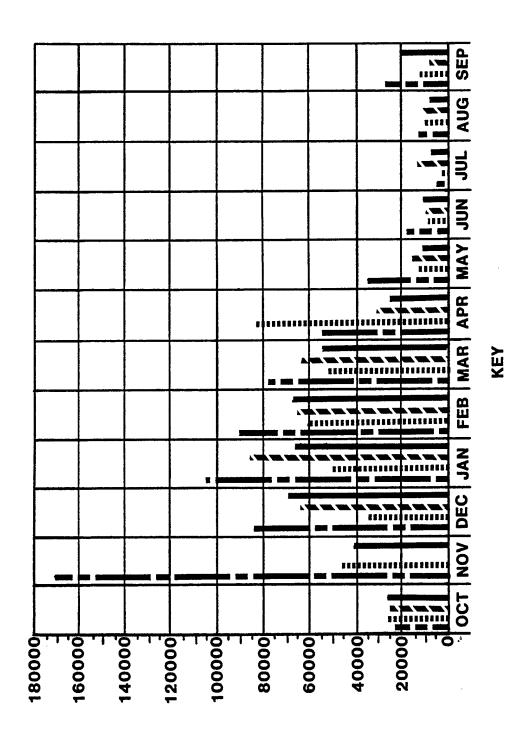


FIGURE 2-3 MONTHLY OIL ENERGY USAGE FY75 FY80 FY81 FY82

**-1982** 

#### 3. ENERGY CONSERVATION MEASURES DEVELOPED

#### Basis of Analysis for ECO Evaluation

Energy conservation opportunities were evaluated on the basis of letter, DAEN-MPO-U, 10 August 1982, subject: Energy Conservation Investment Program (ECIP) Guidance.

The ECIP Guidance requires that the evaluation be made as follows:

- 1. Life Cycle Savings to Investment Ratio (SIR)
- 2. Recommended simplified economic analysis summary format.
- 3. Present worth factors as tabulated in DAEN-MPO-U.
- 4. Energy costs and construction costs at the installation on the <u>date of analysis</u>.

Ewing Cole Cherry Parsky wrote a computer program based on the recommended simplified economic analysis summary format. This program is written in BASIC for use on an IBM/PC computer and a printout is included in Volume 2B, Chapter 5 and Volume 4B, Section 2 for future use by Fort Meade.

"Date of Analysis" energy costs used in the calculations are estimated fiscal year 1983 values, including values for Baltimore Gas & Electric scheduled rate increases, as obtained from the Chief, Environmental & Control Office, Fort George G. Meade.

Ewing Cole Cherry Parsky has on its staff General Construction, Mechanical and Electrical Engineers with actual contracting experience whose specialty is cost estimating and who were involved in estimating the construction costs. Cost information was obtained from vendors and the R. S. Means Construction Cost Guide where appropriate and cost estimates were established based on experience and judgment for the estimated actual installation conditions for each item. SIOH (Supervision, Inspection and Overhead) and Design Costs were established by the Army at 5% and 6%, respectively, of the construction cost and then the investment cost was calculated in accordance with the requirements of the ECIP Guidelines. (Note: The Interim Submission review comments indicate that SIOH has been revised to 5.5%. By agreement, this change is incorporated only on the 1391 Forms for the PDB's in Volume 3 of the report.)

#### Energy Conservation Opportunities Investigated

A general summary of Potential Energy Conservation Opportunities developed for the various buildings in the Contract during Phase 1 is attached as Table 3.1, starting on Page ES-3.9.

Energy savings, energy cost savings, installation costs and savings to investment ratio for the various Energy Conservation Opportunities determined during Phase 1, as well as additional items developed during the Phase II work, were calculated using the preceding procedure. More detailed information on the ECO's is also included in Volume 2B, Main Report and in Volume 4B, Section 3.

The ECO's were analyzed for funding in accordance with Funding Diagram 3.2 on Page ES-3.16.

The various Energy Conservation Opportunities were originally grouped by "construction trade" for the purposes of determining potential ECIP projects. Fort Meade and the Army requested, however, that all items in any building be included in one project and that all applicable items be included in projects. The items were then organized into groups as follows:

- El Buildings With Major Boiler Work
- E2 Housing Units
- E3 Buildings With Major Insulation Work
- E4 Buildings With Miscellaneous Heating, Ventilating and Air Conditioning and Automatic Temperature Control Work
- E5 Solar Energy
- 6 Increment F Items
- 7 Items Which Do Not Qualify Under EEAP Program Increment G

#### ECIP Projects

Table 3.3 starting on page ES-3.17 summarizes the recommended ECIP projects, including extrapolated buildings and Increment C.

#### Other Projects

The dollar value of the category 7 items is not sufficient to warrant separate Increment G projects and these are, therefore, included in Increment F. Table 6.1 starting on Page ES-6.9 of this Executive Summary summarizes the recommended Increment F and G projects.

#### Energy Management and Control System

The Honeywell CPU installed in 1977 is a back plane wired system using random access memory for the files and operating system. The latest revision is Honeywell REV 1175. This is an all electronic unit and revisions have been made to clean up the software and include all changes or "patches" made over the 1977-1983 period of time.

The following options are available for the new Delta 1000 CPU:

- Colorographic CRT This provides interactive graphic displays with normal command and data retrieval functions for an optimum operator interface. The operator has a pictorial representation of the system plus dynamic information on the graphic picture such as fan status, supply air temperature, alarm conditions, return air temperature, pump status, etc.
- 2. <u>Data Manager System</u> This is a microprocessor-based historical storage system that enhances the Delta reporting functions. The software is made up of submodules which provide historical storage (trend logs, energy reports or any logging function may be put on the disk for future retrieval) and maintenance management (preventative maintenance work orders based on calendar days, operating time of the equipment and event occurrences).

The Delta 1000 System can be expanded to a Delta 5200 System which is quite

similar to the Tri-Service Specification.

The following new technologies can be applied to the existing system as well as

current state of the art systems: Direct Digital Control, Fiber Optics and FM

Radio Control.

The Honeywell Delta 1000 EMCS is a viable system and can provide significant

energy savings. It requires, as does any large, sophisticated EMCS, periodic

updating, and constant preventative and corrective maintenance, and this should

be provided. It can be expanded and it is recommended that this be done, as

appropriate, to improve its usefulness.

The existing CPU should be retrofitted or replaced to include current

electronics and software changes and patches made over the 1977 - 1983 period of

time. Budget \$35,000 to \$40,000.

When new buildings are constructed, or existing buildings are altered,

consideration should be given to the use of DDC rather than conventional

automatic temperature controls. For sophisticated control systems, DDC may be

less costly than conventional systems. For any event, DDC reduces the cost of

connection to the EMCS and provides local management - distributive

processing - functions.

Recommendations for improved utilization are as follows:

**EXECUTIVE SUMMARY** 

ES-3.5

- Optimum Start/Stop was not included in the original implementation but Fort
  Meade has begun the process of using this system capability. This process
  should be expedited so that all heating and air conditioning systems under
  control of the EMCS utilize this feature of the system.
- 2. Load reset and reheat reduction were not included in the original implementation. There are no reheat systems under the control of the EMCS. Load reset for water chillers, boilers and heating systems should be implemented through the EMCS for the buildings which are under the control of the EMCS if appropriate.
- Enthalpy control was not included in the original implementation and is not recommended by the Corps of Engineers because their experience is that maintenance costs are too high.
- 4. Electrical demand control was included in the original implementation. For fiscal year 1982, electrical demand charges were \$2,636,173 or 24.4% of the total electrical costs for Fort Meade and NSA. Implementation of additional demand control through the EMCS should be cost effective.

The EMCS is monolithic and any failure of the CPU affects the entire system. Special expertise is required to maintain the CPU and it should be updated as newer versions become available. It is recommended, therefore, that Fort Meade arrange for maintenance of the CPU through a maintenance contract with the manufacturer's (Honeywell) service organization and that the contract include updating of the CPU.

The balance of the system also requires periodic preventative and corrective maintenance. This maintenance can be accomplished by any one, or a combination, of the following three methods.

- 1. Fort Meade personnel
- 2. Contract with an independent service organization
- 3. Contract with the manufacturers' (Honeywell) service organization

Method No. 1 is dependent upon Fort Meade's capability of hiring and keeping qualified personnel. If this can be accomplished, this method will have the lowest cost to Fort Meade.

Method No. 2 is dependent upon being able to find a capable independent service organization and, if so, would probably be more expensive than Method No. 1 and less expensive that Method No. 3.

Method No. 3 is probably the most costly method. It is recommended, however, that Fort Meade consider using Method No. 3, in conjunction with retrofitting of the CPU, for a period of one year for the purpose of modernizing the system and placing it in an operating condition that will provide reliable monitoring and energy management. After this initial year, the contract with Honeywell should be renewed for the CPU and maintenance Method No. 1, No. 2, or No. 3 should be implemented for the balance of the system as Fort Meade deems appropriate.

The Data Manager System and Colorographic CRT have the potential for saving labor and improving maintenance but may not be cost effective.

Fort Meade should consider expanding the EMCS to all buildings which have energy

cost avoidances that will justify the installation cost.

Reliance on manual energy management functions is risky because of the potential

for human error or negligence. Time clocks can be effective, but they require

resetting after every power failure and sometimes require seasonal resetting,

both of which are manual functions. Installation of time clocks with energy

management functions other than on/off approaches or exceeds the cost of

connecting to the EMCS.

The budget price for installing a data gathering panel to control one point is

approximately \$2000. This type of expansion is justifiable when the energy cost

avoidance is \$400 or more per year. The budget price for each additional

control point on the panel is \$400 and is justifiable for each additional

control point that has an annual energy cost avoidance of \$80.

Radio frequency control can be used for expansion to serve smaller buildings and

systems. The initial installation would be justifiable if sufficient control

points can be found that will provide an annual energy cost avoidance of \$1000.

Additional control points can then be added if their cost avoidance is \$65 or

more per year.

Expansion to the Delta 5200 configuration does not appear to be appropriate at

the present time.

EXECUTIVE SUMMARY

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3.1.4 COOLING SYSTEMS

Implemented, Planned or Studied by Fort Meade Potential ECO applicable to building

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EXECUTIVE SUMMARY ES-3.12

Note: Blink spaces indicate that ECO was investigated but found to be not applicable for the building.

3.1.5 CONTROL SYSTEM

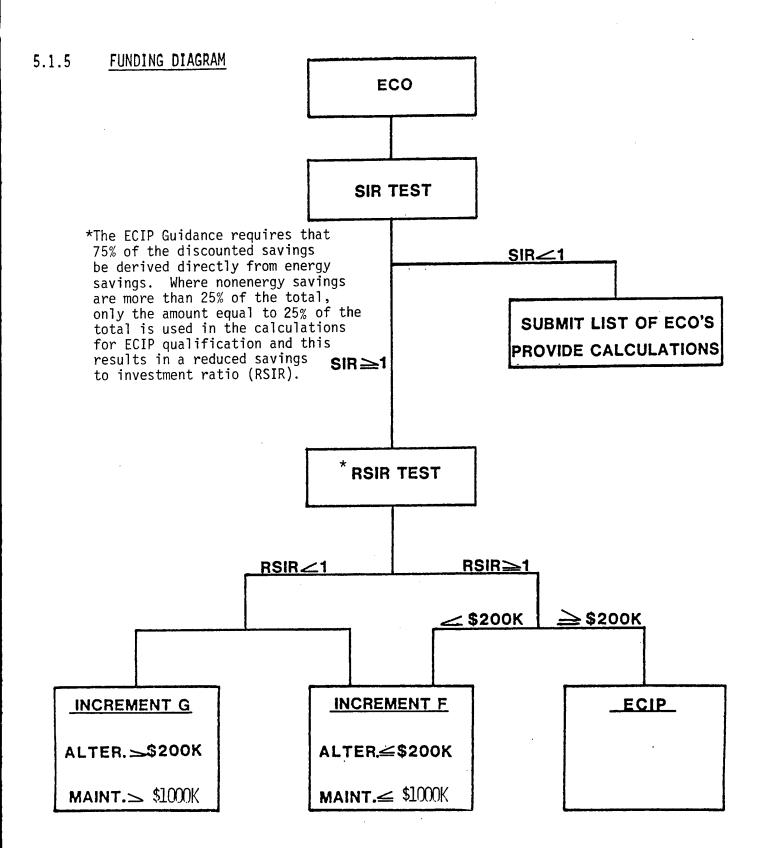
Implemented, Planned or Studied by Fort Meade Potential ECO applicable to building

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3.3 ECIP PROJECTS SUMMARY TABLE

	J.	·	1.27.1	4.7	16.5	
REDUCED SIR			1	ı	ı	
SIR	4.89	3.17	1.12	3.27	1.44	
NON-ENERGY DISCOUNTED SAVINGS(\$)	-21,663	-80,596	8,470	32,161	,	
TOTAL DISCOUNTED SAVINGS (\$)	3,780,289	2,242,874	1,031,900	1,817,109	702,546	
FIRST YEAR COST SAVINGS (\$)	253,212	120,510	60,206	135,780	32,862	
ANNUAL ENERGY SAVINGS (MBTU/YR)	26,535	19,588	8,035	28,118	5,920	
INVESTMENT COST (\$)	772,824	708,298	924,193	555,856	487,647	
TOTAL PROJECT COST (\$)	858,692	786,450	1,026,884	617,624	541,830	
ENERGY CONSERVATION MEASURE	Buildings With Major Boiler Work	Housing Units	Buildings With Major Insulation Work	Buildings With Miscellaneous HVAC and ATC Work	Solar Energy	
BUILDING NO.	E-1	E-2	F-3	E-4	E-5	

EXECUTIVE SUMMARY
ES-3.17

# DETAILED DESCRIPTION OF ECIP PROJECTS

ECIP PROJECT	DESCRIPTION	BUILDINGS
E-1	Buildings With Major Boiler Work	
	Boiler Oxygen Controls	P90BH, P2251, P2482
	Preheat Combustion Air	P90BH, P2251, P2482, P8481
	Boiler Turbulators	P90BH, P2251
	High Efficiency Motor Replacement	P90BH
	Night Setback/Setup	P90
	Economizer Cycle	P90
	Limit Infiltration Hanger Doors	P90
	Zero Energy Band Thermostat	P90
	Thermostatic Control of Fans	P90
	Repair Stack Dampers	P2251, P8481
	Blow Down Heat Recovery	P2251, P2482, P8481
	Stack Economizers	P2482
	Replace Burners	P2482, P8481
	Replace Incandescent Lighting	P2482, P8481
	Decentralized Summer Domestic Hot Water	P8481
E-2	Housing Units	
	Boiler Oxygen Controls	P1644, P1643 Extrapolated
	Preheat Combustion Air	P1644, P1643 Extrapolated
	Boiler Turbulators	P1644, P1643 Extrapolated
	Night Setback/Setup	P1644, P1643 Extrapolated

EXECUTIVE SUMMARY ES-3.18

ECIP PROJECT	DESCRIPTION	BUILDINGS
E-2	Housing Units (CONTINUED)	
	Night Setback/Setup	*P3073C + 199 Extrapolated Apartments
	Vent Dampers - Boiler or Furnace and Water Heater	*P3073C + 199 Extrapolated Apartments *P4247 + 29 Extrapolated Buildings *P4523 + 27 Extrapolated Buildings
	Storm Windows	*P4247 + 29 Extrapolated Buildings *P7638B + 75 Extrapolated Apartments
	Weatherstripping and Caulking	*P4247 + 29 Extrapolated Buildings *P7338F+ 209 Extrapolated Apartments *P7638B + 75 Extrapolated Apartments
	Boiler Replacement	*P4247 + 29 Extrapolated Buildings *P4523 + 27 Extrapolated Buildings
	Insulation - Garage Ceiling	*P4523 + 27 Extrapolated Buildings
	Insulation - Garage Wall	*P4523 + 27 Extrapolated Buildings
	Replace Kitchen Exhaust Damper	*P7338F + 30 Extrapolated Apartments
	Replace Attic Fan Louvers	*P7338F + 30 Extrapolated Apartments
,	*EXTRAPOLATIONS	
	P3073C: 61 buildings - P3010 through P3074247: 29 buildings - P4231 through P4074523: 27 buildings - P4501, P4511, P4074544, P4546 through P4549, P4544, P4546 through P7338F: 37 buildings - P7301 through P707438B: 37 buildings - P7604, P7606 through P7638B: 37 buildings - P7604, P7606 through P7638B: 37 buildings - P7604, P7606 through P7638B: 37 buildings - P7604, P7606 through P7638B: 37 buildings - P7604, P7606 through P307447545 through P7638B: 37 buildings - P7604, P7606 through P30744755 through P45495 through P45295 th	260 519, P4521, P4522, P4524, P4526 4531 through P4539, P4541 through ough P4549 315, P7318 through P7332, P7334, ough P7343
E-3	Buildings With Major Insulation Work  Insulation - Outside Wall Exterior Surface	P8472

EXECUTIVE SUMMARY ES-3.19

P9801 + P9802, P9803, P9804 Extrapolated

Insulation - Outside Wall Interior Surface

ECIP PROJECT

DESCRIPTION

**BUILDINGS** 

# E-3 <u>Buildings With Major Insulation Work</u> Continued...

Modify Controls - Shut Off OA

P8472

On Warmup

High Efficiency Motor Replacement

P9801 + P9802, P9803, P9804

Extrapolated

Chiller Reset Controls

P9801 + P9802, P9803, P9804

Extrapolated

### E-4 Buildings With Miscellaneous HVAC and ATC Work

Economizer Cycle

T504, P4551, P4700

Night Setback/Setup

T608, T726 +\*20 Extrapolated Buildings

P2490, P4272, P4705

Insulation - Piping

T726 +\*20 Extrapolated Buildings

Insulation - Ductwork

T726 +\*20 Extrapolated Buildings

Revise Controls - 48-hr. Timer

T726 +\*20 Extrapolated Buildings

Modify Controls - Shut off OA

on Warmup

P2239, P4552, P4554

P8452, P9829

Summer Steam Boiler

P2239

Boiler Turbulators

P2239, P2257, P4554, P7100

Solar Film

P2257 (Barracks), P4705, P7100, P8452

Radiator Controls

P2257, P4553, P4554

Chiller Reset Controls

P2257, P2480, P2490, P4215,

P4411, P4550, P4705, P7100,

P8605 +\*10 Extrapolated Buildings,

P9827, P9828

### \*EXTRAPOLATIONS

T726: 20 buildings - T702 through T708, T722 through T727, T728, T732 through

T738

P8605: 10 buildings - P8478, P8479, P8543, P8544, P8545, P8606, P8607, P8609, P8611

EXECUTIVE SUMMARY
ES-3.20

ECIP PROJECT	DESCRIPTION	BUILDINGS
E-4	Buildings With Miscellaneous HVAC and	ATC Work (CONTINUED)
	High Efficiency Motor Replacement	P2480, P2490, P4205, P4272, P4550, P6330, P7100, P8605 +*10 Extrapolated Buildings, P9827, P9828, P9829
	Control Domestic Hot Water Pump	P6330, P9829
	Reduce CFM/Shutoff on Unoccupied	P2480
	Chiller Heat Recovery	P2480
	Reduce OA, Unoccupied & Warmup	P6330
	Zone Dampers to Separate Emergency and Pharmacy	P2480
	Exhaust to Make Up Air Heat Recovery	P6330
	Decentralize Hot Water	P7100
	Weatherstripping and Caulking	P8452
	Exhaust Fan Time Clocks	P8452
	Zero Energy Band Thermostats	P8452, P9827
E-5	Solar Energy - Domestic Hot Water	
	Barracks Building	P8605 + Extrapolated Buildings: (P8478, P8479, P8543, P8544, P8545, P8606, P8607, P8609, P8610, P8611, P9801, P9802, P9803, P9804, P9827, P9828)
	Other Buildings	T2250, P2480, P6330

# \*EXTRAPOLATIONS

P8605: 10 buildings - P8478, P8479, P8543, P8544, P8545, P8606, P8607, P8609, P8611

EXECUTIVE SUMMARY

ES-3.21

### 4. ENERGY AND COST SAVINGS

# Summary

The following Tables 4.1 through 4.4 summarize the potential energy savings. These indicate that for the Fort Meade facilities there is a potential savings of 76,838 MBTU per year if all of the ECIP projects are implemented and 30,384 MBTU per year if all of the Increment F projects are implemented, with a grand total potential savings of 107,222 MBTU per year. These savings, coupled with the savings that were previously established as noted by comparing FY82 data with base year FY75 data, together with projected savings of 94,770 MBTU per year for ECIP projects under construction, indicate on Table 4.4 that the goal savings of 20% will be exceeded by 6.8% if all of the projects are implemented.

The Tables also indicate that for the NSA Buildings surveyed, and their extrapolations, there is a potential savings of 11,358 MBTU per year if the ECIP projects are implemented and 6,518 MBTU per year if the Increment F projects are implemented, with a grand total potential savings of 17,876 MBTU per year.

4.1	ECIP & INCREMENT F PROJECTS	FUE	LSAVING	s s	UMMARY-ME	3TY	/Y FOR E	ACH	FUEL
ECIP	PROJECTS	<u>E</u> !	LECTRIC		GAS		<u>OIL</u>	•	TOTAL
E-1	Buildings with Major Boiler Work	F	2,916	F(	-)15,212	F	38,831	F	26,535
E-2 E-3	Housing Units Buildings With Major Insulation Work	F	0	F	15,916	F	3,672	F	19,588
	Buildings Other Than 9800 Buildings	F	14	F	0	F	228	F	242
•	9800 Buildings	N	1,689	N	0	N	6,104	N	7,793
E-4	Buildings With Miscellaneous HVAC and ATC Work								
	Buildings Other Than 9800	F	14,305	F	6,309	F	5,944	F	26,558
	9800 Buildings	N	990	N	0	N	570	N	1,560
E-5	Solar Energy								
	Buildings Other Than 9800 Buildings	F	0	F	1,393	F	2,522	. F	3,915
	9800 Buildings	N	0	N	0	·N	2,005	N	2,005
	Totals Fort Meade Totals NSA Buildings		17,235 2,679	-	8,406 0		51,197 8,679		76,838 11,358
Tota	ls ECIP Projects		19,914		8,406		59,876		88,196
Incr	ement F and G Projects								
	ls Fort Meade Is NSA Buildings		13,681 4,235		5,983 0		10,720 2,283		30,384 6,518
Tota	Is Increment F and G		17,916		5,983		13,003		36,902
Gran	d Totals								
	Totals Fort Meade Totals NSA Buildings		30,916 6,914		14,389 0		61,917 10,962	<u>-</u>	107,222 17,876
Gran	d Totals		37,830		14,389		72,879	]	125,098
	F = Totals Fort Meade		N	=	Totals	NS	SA Build	ings	

EXECUTIVE SUMMARY ES-4.2

4.2 INCREMENT F AND G PROJECTS FUEL SAVINGS MBTU/YR FOR EACH FUEL

	T							<u> </u>							
TOTAL N	<u>'</u>	1	1	1	(	1	ı	1	ı		ı		5,370	1	
T0	1,881	79	443	1,144	357	3,376	4,610	182	2,423	1,842	52	222	1	4	
OIL N		١	I	ı		1	ţ	ı	1	ı	ı	ı	2,283	ı	
0 4	1,881	62	340	1,144	357	. 1	2,506	,	2,423	1,825	ı	,	ı	1	
GAS		, '	ı	,	1	ŧ	1		ı	ı	ı	ı	1	ŧ	
	,	ı	103	ı	•	3,376	t	ı	ı	17	52	126	ı	ı	
RIC N	'	•	ı	ı	ı	1	ı	ı		ı	ı	•	3,087	ı	
ELECTRIC F N	1	ı	ı	,		•	2,104	182	,	l	ı	96	1	4	
ANNUAL ENERGY SAVINGS (MBTU/YR)	1,881	62	443	1,144	357	3,376	4,610	182	2,423	1,842	52	222	5,370	4	
INVESTMENT COST (\$)	168	42	178	749	200	2,424	6,039	275	10,439	16,456	300	666	26,254	75	
PROJECT COST INVESTMENT (\$) (\$)	192	47	199	832	555	2,626	6,720	306	11,605	18,284	333	1,110	29,304	84	
ENERGY CONSERVATION MEASURE	Reduce Domestic Hot Water Setpoint Buildings 370 and 8605 + 10 Extrapolated Buildings	Piping Insulation Building 8472	Adjust Controls To Reduce Overheating Buildings 2239, 2246, 4411 (not accurately quantifiable)	Repair Burners Building 90BH	Repair Leaks, Condensate Pump Building 8605	Seal Kitchen Exhaust Damper Apartment 1837F + 100 Extrapolated Apartments	Reduce Outside Air, Rebalance, Building 8605 + 10 Extrapolated Buildings	Reduce Lighting Levels Building 1978	Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Buildings	Weatherstripping and Caulking, Doors and Windows, Buildings 2250, 4451	Clean Radiators, Building 4431 (Note: Not Accurately Quantifiable)	Zero Energy Band Thermostats Building 370	Reduce CFM, Day/Night Time Clocks, Buildings 9801 + 3 Extrapolated Buildings, 9828	Photo Cell Exterior Lighting Building 2793	
PROJECT NO.	F-1	F-2	F-3	F-4	F-5	F-6	F-7	F-8	F-9	F-10	F-11	F-12	F-13	F-14	

F = Totals Fort Meade Buildings N = Totals NSA Buildings

4.2 INCREMENT F AND G PROJECTS FUEL SAVINGS MBTU/YR FOR EACH FUEL (Continued)

PROJECT NO.	ENERGY CONSERVATION MEASURE	TOTAL PROJECT COST INVESTMENT (\$)	i	ANNUAL ENERGY SAVINGS (MBTU/YR)	ELECTRIC F N	RIC	GAS	z S	011.	2	TOTAL	AL N
F-15	Weatherstripping, Garage Doors - Wing C, Building 2246	777	669	105	,	1	,	,	105		105	
F-16	Night Setback/Setup 1837F (Boiler for Buildings 1836, 1837, 1938) + 34 Extrapolated Boilers	36,890	33,215	2,196	ı	ı	2,196	ı	ı	1	2,196	1
F-17	Reduce Air Flow To Design CFM, Rebalance Building 4432	611	549	92	95	ı	ı	1	1	ı	35	ı
F-18	Reduce Outside Air, Rebalance Building 90, 4550	1,220	1,098	69	29	1	10	ı	30	ı	69	,
F-19	Energy Conserving Fluorescent Lamps, Various Buildings	43,216	38,904	9,534	8,386	1,148	1	ı	ı	ı	8,386	1,148
F-20	Economizer Cycles, CPO Area and Redwood Cafe, Building 4432	5,772	5,195	763	763	ı	1	ı	ı	ı	763	ı
F-21	Maintenance - Unit Heater Building 2276	166	150	9	ı	t	1	ı	9	ı	9	,
F-22	Heat Pump for Domestic Hot Water, Building 8688	1,388	1,249	15	15	ı	1	ı	ı	ı	15	ı
F-23	Remove Vestibule Radiators Building 4551	244	210	ഹ	ı	ı	ù	ı	,	ı		1
F-24	Weatherstrip Window Air Conditioning Unit Building 504	30	27	<b>F</b> -4`	ı	,	-1	1	1	ı	<del>-</del>	ı
F-25	Modify Controls, Shut Off Outside Air on Warmup, 100%, Outside Air on Cool Down Buildings 4431, 4432	3,996	3,597	76	ı	ı	6	1	ı	ı	26	ı
F-26	Demand Control, Building 4272	555	200	0	0	,	1	ı	,	ı	0	,
F-27	Replace Incandescent Lamps with Fluorescent Lamps, Various Buildings	24,843	21,707	1,864	1	1	•	t	ı	ı	1,864	1
F-28	High Efficiency Motor Replacement Building 4217	1,354	1,219	39	39	,	ı	ı	1	1	38	,
						· · · · · · · · · · · · · · · · · · ·		<del> </del>			<del></del>	
Totale	C = Total Cout Monda D. 23 4.						1	1	1	1	1	7

F = Totals Fort Meade Buildings N = Totals NSA Buildings

4.2 INCREMENT F AND G PROJECTS FUEL SAVINGS MBTU/YR FOR EACH FUEL (Continued)

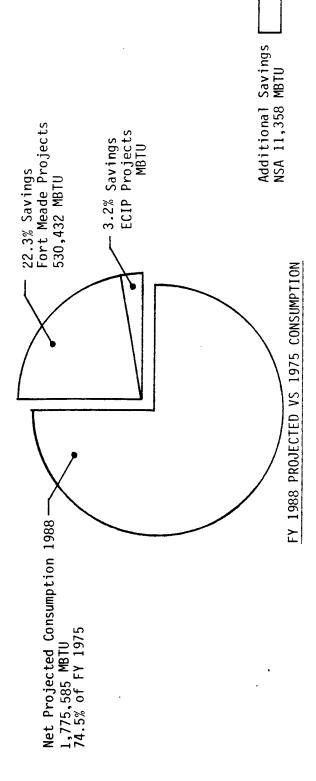
F-29 Ducthork Insulation Building 4551 77 64 3 3	PROJECT NO.	ENERGY CONSERVATION MEASURE	TOTAL PROJECT COST INVESTMENT (\$)		ANNUAL ENERGY SAVINGS (MBTU/YR)	ELECTRIC F N	RIC	GAS	z	01L F	ור א	TOTAL F	AL N
Control Domestic Hot Water Pump  Buildings 370, 4411  Solar Film Buildings 4415, 4432  Solar Film Buildings 4415, 4432  Insulation, Interior Ceiling and Wall,  Building 2246 Arms Room  Modify Outside Afri Vent Building 4432  Seal Manhole Cover Building 4551  Modify Intake Ductwork Building 4554  Repair Barometric Damper Building 756  Repair Barometric Damper Building 756  Repair Barometric Lamps  Quantifiable Grand Total  202,883  181,866  36,902  13,681  27,983  Quantifiable Grand Total	F-29	Ductwork Insulation Building 4551	72	64	е	m	ı	,	,	,	,	ო	'
Solar Film Buildings 4415, 4432  Solar Film Buildings 4415, 4432  Insulation, Interior Celling and Wall, Building 2246 Arms Room Modify Outside Air Vent Building 4432  Seal Manhole Cover Building 4551  Modify Intake Ductwork Building 4554  Repair Barometric Damper Building 726  Repair Barometric Outlet and Switch Energy  Electric Outlet and Switch Energy  Quantifiable Grand Total  202,883  181,866  36,902  13,681  4,235  5,983	F-30	Control Domestic Hot Water Pump Buildings 370, 4411	444	400	4	4	1	ı	ı	ı	1	4	ı
Insulation, Interior Ceiling and Wall, 3,885 3,497 24	F-31	Solar Film Buildings 4415, 4432	3,362	3,027	100	100		ı	1	ı	ı	100	ı
Modify Outside Air Vent Building 4432       910       89       *       -       *       -       -       *       -       -       *       -       -       *       -       -       *       -       -       *       -       -       *       - <td>F-32</td> <td>Insulation, Interior Ceiling and Wall, Building 2246 Arms Room</td> <td>3,885</td> <td>3,497</td> <td>24</td> <td>1</td> <td>ı</td> <td>ı</td> <td>ı</td> <td>24</td> <td>ı</td> <td>24</td> <td>ı</td>	F-32	Insulation, Interior Ceiling and Wall, Building 2246 Arms Room	3,885	3,497	24	1	ı	ı	ı	24	ı	24	ı
Seal Manhole Cover Building 4551  Modify Intake Ductwork Building 4554  Repair Barometric Damper Building 726  Repair Barometric Damper	F-33	Modify Outside Air Vent Building 4432	910	68	*	ı	ı	*	ı	ı	ı	*	ı
Modify Intake Ductwork Building 4554 722 650 * * - * - * * - * * - * -	F-34	Seal Manhole Cover Building 4551	145	131	*	ı	1	*	,	ı	ı	*	ı
Repair Barometric Damper Building 726       84       75       * <td>F-35</td> <td>Modify Intake Ductwork Building 4554</td> <td>722</td> <td>650</td> <td>*</td> <td>ı</td> <td>1</td> <td>*</td> <td>ı</td> <td>ı</td> <td>1</td> <td>*</td> <td>1</td>	F-35	Modify Intake Ductwork Building 4554	722	650	*	ı	1	*	ı	ı	1	*	1
Electric Outlet and Switch Energy	F-36	Repair Barometric Damper Building 726	84	75	*	ı	1	*	ı	ı	1	*	i
202,883 181,866 36,902 13,681 4,235 5,983	F-37	Electric Outlet and Switch Energy Seals	*	*	*	*	*	*	*	*	*	*	*
		Quantifiable Grand Total	202,883	181,866	36,902	13,681		5,983	0	10,720	2,283	2,283 30,384	6,518

\* Not Quantifiable F = Totals Fort Meade Buildings N = Totals NSA Buildings

		FY 1975			*	*** PROJE	*** PROJECTED FY 1988	
FUEL TYPE	CONSUMPTION	% TOTAL CONSUM.	ENERGY COST \$	% T0TAL	PROJECTED CONSUMPTION MBTU	% TOTAL CONSUM.	ENERGY COST \$**	% T0TAL
Electricity Natural Gas No. 2 Fuel Oil	875,689 803,920 703,246	36.8 33.7 29.5	* * *	* * *	904,886 615,927 349,542	48.4 32.9 18.7	4,117,231 4,502,426 3,554,842	33.8 37.0 29.2
	2,382,855	100.0		-	1,870,355	100.0	12,174,499	100.0

\*\*\* Projected 1988 1,870,355 MBTU; Projected Savings Projects Under Construction = 94,770 MBTU Net Projected 1988 1,775,585 MBTU; Net Projected 1988 = 74.5% of 1975

EXECUTIVE SUMMARY ES-4.6



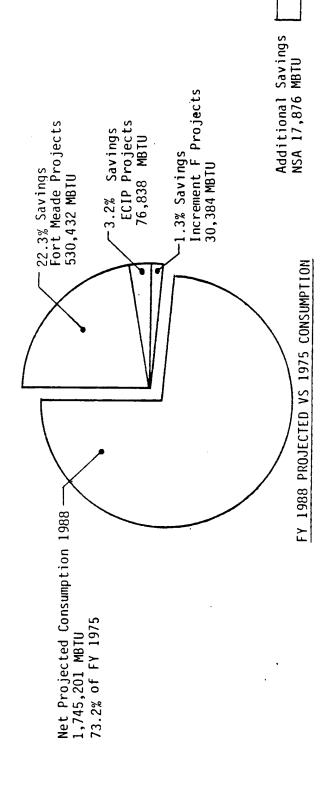
Information Not Available

\*\*\*

Fuel Costs Escalated from 1982 Costs Not Including Savings For Projects Under Construction \*

100.0 37.3 28.8 TOTAL 4,458,690 3,445,819 11,959,492 4,054,983 ENERGY COST \*\*\* PROJECTED FY 1988 TOTAL 100.0 48.4 33.2 18.4 CONSUMPTION PROJECTED 891,205 609,944 338,822 1,839,971 TOTAL ENERGY COST FY 1975 TOTAL CONSUM 36.8 33.7 29.5 100.0 CONSUMPTION 875,689 803,920 703,246 2,382,855 MBTU Natural Gas No. 2 Fuel Oil FUEL TYPE **Electricity** 

\*\*\* Projected 1988 1,839,971 MBTU; Projected Savings Projects Under Construction = 94,770 MBTU Net Projected 1988 1,745,201 MBTU; Net Projected 1988 = 73.2% of 1975



Information Not Available

Fuel Costs Escalated from 1982 Costs Not Including Savings For Projects Under Construction \*\*\*

# 5. INCREMENT C - SOLAR

### Scope

This chapter presents Increment C, renewable energy studies, of the Energy Engineering Analysis Program (EEAP) and identifies solar energy opportunities at Fort George G. Meade.

The Energy Engineering Analysis Program (EEAP) for Increment C covers the following items:

- Determine the feasibility of using solar and other renewable energy to supply space heating, cooling, domestic hot water or process heat. Refuse incineration is considered to be a renewable energy source, but is not included in this increment.
- 2. Perform a life cycle cost analysis using the Engineering Technical Letter (ETL) 1110-3-332 dated March 22, 1982.

During contract negotiations these requirements were limited to solar studies only. The solar studies are not to include space heating or cooling.

The "SOLFEAS" computer simulation program developed by the Construction Engineering Research Laboratory (CERL), COE, Champaign, Illinois was selected to perform the studies for this Contract, since it meets all

requirements and provides all components of the economic analysis. This program has recently been developed by CERL in conjunction with personnel from the Fort Worth district and contains integral weather data for 248 weather service stations known as SOLMET stations.

### Results

The buildings surveyed under the Contract were categorized into groups on the basis of type of usage as follows:

Group 1 - Family Housing

Group 2 - Shops and Hangars

Group 3 - Mess Hall

Group 4 - Administration

Group 5 - Quarters

Group 6 - Laundry

Group 7 - Swimming Pool

Group 8 - Hospital

Group 9 - Other Usage

A typical building was selected for Groups 1 through 8 and monthly load profile calculated by proportioning annual load on the basis of number of days per month. The results are shown in Table 5.1, Page ES-5.4.

The SOLFEAS program was then run for each building and the optimum selections from the program are summarized in Table 5.2, Page ES-5.5.

As can be seen from Table 5.2, the use of solar energy for summer water heating is feasible for small contributions - 10% to 20% - of relatively large year round loads in excess of approximately 1400 MBTU/Y for gas fired systems and approximately 600 MBTU/Y for oil-fired systems. There is a potential conflict between the SOLFEAS runs showing paybacks for 10% to 20%

solar contributions versus ETL 1110-3-302 requirements for a minimum 35% sizing for domestic hot water solar systems.

# Supplementary Information

Subsequent to the original SOLFEAS calculations, it was determined that it is feasible to shut down Boiler Plant P-8481 in the summer and install local gas-fired boilers/heaters in the equipment rooms of the various buildings served by it to provide summer domestic hot water and steam as may be required. This includes Buildings P8478, P-8479, P-8543, P-8544, P-8545, P-8605, P-8606, P-8607, P-8609 and P-8611.

SOLFEAS, however, allows only use of one fuel to determine life cycle cost. The SOLFEAS data was, therefore, extrapolated for combination gas/oil for these buildings.

### Recommendations

It is recommended that such solar energy systems be provided for Buildings P-8605 (and by extrapolation from P-8605 for Buildings P-8478, P-8479, P-8543, P-8544, P-8545, P-8606, P-8607, P-8609, P-8610, P-8611, P-9801, P-9802, P-9803, P-9804, P-9827 and P-9828 - see Table 5.2, Page ES-5.4 for extrapolation values), T-2250, P-6330 and P-2480 as an ECIP project.

# 5.1 MONTHLY MBTU LOAD PROFILE FOR TYPICAL BUILDINGS

				BUILDING				
MONTH	GROUP 1 P-3073C	GROUP 2 P-90	GROUP 3 P-2239	GROUP 4 P-1978	GROUP 5 P-8605	GROUP 6 T-2250	GROUP 7 P-6330	GROUP 8 P-2480
JAN	1.81	1.42	83.67	3.25	52.87	872.82	104.48	216.91
FEB	1.61	1.26	75.54	2.96	47.76	788.34	94.38	195.93
MAR	1.81	1.42	83.67	3.25	52.87	872.82	104.48	216.91
APR	1.75	1.37	80.97	3.15	51.17	844.66	101.11	209.92
MAY	1.81	1.42	83.67	3.25	52.87	872.82	104.48	216.91
JUN	1.75	1.37	80.97	3.15	51.17	844.66	101.11	209.92
JUL	1.81	1.42	83.67	3.25	52.87	872.82	104.48	216.91
AUG	1.81	1.42	83.67	3.25	52.87	872.82	104.48	216.91
SEP	1.75	1.37	80.97	3.15	51.17	844.66	101.11	209.92
OCT	1.81	1.42	83.67	3.25	52.87	872.82	104.48	216.91
NOV	1.75	1.37	80.97	3.15	51.17	844.66	101.11	209.92
DEC	1.81	1.42	83.67	3.25	52.87	872.82	104.48	216.91
TOTAL	21.28	16.68	985.11	38.31	622.53	10276.72	1230.18	2553.98

SOLFEAS PROGRAM SUMMARY 5.2

	,	+		+	<del></del>	· · · · · · · · · · · · · · · · · · ·	+			<del></del>
MAXIMUM SIR	0*	0*	.962	990. *	1.10		2.078	1.019	1.824	1.417
CONSTR. COST	2990	2990	12930	7500	16540	. 165400	106000	30100	28290	195500
MBTU/Y SAVED	9.9	9.9	265.3	36.1	169.6	1696.0	1376.3	329.7	343.9	2004.7
% BASE SAVED	33.0	39.5	20.2	70.7	20.4	20.4	10.1	20.1	10.1	20.4
CONVENTIONAL FUEL	GAS	ELECT	GAS	GAS	01L/GAS**	01L/GAS**	011	GAS	710	01L
BASE ENERGY MBTU/Y	28.4	16.7	1313.5	51.1	830.0	8300.0	13627.2	1640.2	3405.3	9810.6
COLLECTOR AREA SQ. FT.	20	20	500	120	320	on 3200	2300	620	580	3780
BUILDING	P-3073C	P-90	P-2239	P-1978	P-8605	Extrapolation	T-2250	P-6330	P-2480	P-9800 Bldgs Extrapolated (11.82)
GROUP NO.	1	2	3	4	5		9	7	8	5

EXECUTIVE SUMMARY ES-5.5

\* Discounted Payback in Excess of 100 Years.

See Supplementary Information \*

# 6. INCREMENT "F" - FACILITY ENGINEER CONSERVATION MEASURES

# Energy Actions by Fort George G. Meade

Fort George G. Meade is to be complimented on the considerable amount of successful effort it has expended on energy conservation, as demonstrated by the results shown in the "Installation Facility Energy Plan" for fiscal years 1981 and 1983 summarized herein. The FY82 consumption represented an 18.3% reduction in energy use from the FY75 base line.

Most of the commonly known, easy to implement energy conservation opportunities -items such as storm windows, weatherstripping and caulking, insulation, etc. - have been or are in the process of being implemented at Fort Meade.

Some not so common but excellent energy conservation items have been or will be installed. This includes items such as boiler stack economizer and oxygen trim control on the two large boilers in Bulding P-8481, a waste water heat recovery system in Laundry Building T-2250, planned installation of a refrigerant compressor heat recovery system in Cold Storage Building P-4272, and an exhaust to make up air heat recovery system in NSA Consolidated Mess Building P-9829. A central Energy Management Control System was installed in 1977. A demonstration solar house is located on the Post and tests have been performed to determine energy savings available from solar energy. (The house used solar energy for heating as well as domestic hot water. The technical report does not provide information relevant to large domestic hot water only systems

analyzed as part of this report.) Additional information is shown in the charts included in Section 3 under the heading "3.1 General Summary of Potential Energy Conservation Opportunities", starting on Page ES-3.9.

Projects accomplished under OMA funds include elimination of water heaters, replacement of incandescent lighting with fluorescent lighting, improvements to combustion controls, replacement of boilers and burners, replacement of transformers and switchgear, replacement of inefficient furnaces, replacement of inefficient water heaters, reduction of interior and exterior lighting, consolidation of building space, installation of energy conserving shower inserts, and miscellaneous other energy conservation improvements.

The Fort Meade energy program also includes the following items:

- o Publicity to encourage energy conservation
- o Technical assistance visits to note energy deficiencies and initiate corrective action
- o Energy hot line and heat line for building occupants to report energy conservation problems or to find out the current policy
- Special utility equipment permits issued to building occupants as one means to control and account for energy consumption of electrical appliances
- o New construction projects review to determine if adequate provisions have been made for conserving energy
- o Controlled air conditioning/heating seasons
- o Controlled air conditioning/heating/ventilation operating procedures
- o Domestic hot water discontinued wherever possible and controls lowered to minimum temperature setting elsewhere

# o Lighting reduction

In addition, prior to the recommendations in the Interim Phase II submission, Fort Meade combined the heating and air conditioning shops and established a separate team within the combined shop for automatic control system service and maintenance.

The tables and charts on the following five pages are reproduced from the FY83 Installation Facilities Energy Plan to summarize energy data pertinent to Fort Meade. The data shown does not include NSA facilities.

# Increment A, B, C and G Projects

Table 3.3, ECIP Projects Summary Table, starting on Page ES-3.17 in Section 3, summarizes the Increment A, B, and C ECIP projects, including extrapolated buildings.

The dollar value of the Increment G items is not sufficient to warrant separate Increment G projects and these are, therefore, included in Increment F.

### Increment F and G Projects

Table 6.1, Increment F and G Projects Summary Table, starting on Page ES-6.9, summarizes the recommended Increment F and G projects and Table 6.2, Increment F and G Projects Labor and Material Summary, starting on Page ES-6.12, provides breakdown information on labor and material for each project.

### ENERGY DATA

	M81 FY7	-	MBT FY8	-		CENT INGE
	OWNED	LEASED	GBNWD	LEASED	OWNED	LEASED
DEIS Facilities Energy	2,492,277		2,020,083		-18.9	
Non-DEIS Facilities						
Energy						
Solar						
Hydro						
Refuse Derived Fuel						
Wood						
Other						
Total Facilities Energy	2,492,277		2,020,083		-18.9	
Total Mobility Energy	232,994		171,791		-26.3	·

•			ANNUAL S	SAVINGS	YEAR SAVINGS
INVESTMENT	#PROJECT	COST 5	<u>(soco)1</u>	MBTU	BEGIN
<sub>A</sub> 2	N/A			•	
LUÎP (MCA)	1	152.0	20.2	8,009	77
11 (1.571)	ī	727.0	124.53	36,7433	
n	2	1,643.1	519.7	128,892	79
**	ī	991.0	450 6	81,010	80
11	2	185.4	159.4	19,760	82
я	2	3,500.0	582.3	78,500	84
It	ī	6,343.1	1,450.8	117,505	27
ECIP (FHMA)	ž	2,357.0	190.0	65,075	82
EGI. (Transity	ī	608.0	72.4	16,170	84
11	Ž	7,947.3	809.6	118,598	37
PAA	ä				
ECAM	Ō		` <del></del>		
OTHER	Ċ				

- 1/ Annual cost savings are shown in terms of projected first year savings. Values are not escalated to reflect current fuel cost.
- 2/ Energy improvements are being made under CMA funded projects. However, records are not kept to separate improvement costs or savings.
- 3/ Data represents savings anticipated by installation of EMCS. System has been non-operational for most of the period since installation. Recent efforts to revitalize the system have restored 50% of its capacity to conserve energy.

FACILITY ENERGY CONSUMPTION/OBJECTIVE - FY75 thru FY83

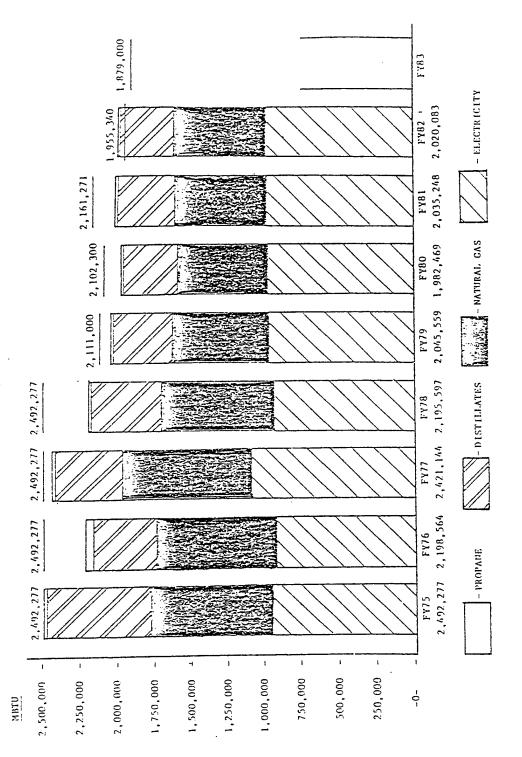


Figure - 2

ENERGY DATA

HISTORIC/GOALS

			HISTORIC	ORIC					0 9	GOALS	
	FY75	FY76	FY77	FY78	FY79	FY80	FY 0.1	FYEE	FY83	FY84	FY85
ENERGY CONSUMPTION (BTU x 10 <sup>9</sup> )	2492	2274	2373	2197	2046	1982	2035	2020	18791 2018 <sup>2</sup> 2013 <sup>2</sup>	20182	20132
$\rm BTU \times 10^3/SF$	(216.6 <sup>4</sup> 197.8	206.7	215.7	(216.64 197.8 206.7 215.7 207.3	190.9	183.6	181.7	182.0	190.9 183.6 181.7 182.0 167.8 <sup>3</sup> 177 <sup>2</sup> 175 <sup>2</sup>	1772	1752
FACILITIES (SF x 106)	12.6	11.0	11.0	10.6	10.8	10.0	10.8	11.11	11.2		11.4 11.5
SAVINGS OVER FY75 (BTU x 10 <sup>9</sup> )	ì	218	119	295	446	509	457	472	613	474	479

1/ Reflects FY83 Facility Energy Goal set by FORSCOM.

2/ Reflects BTU/SF Goals for Fort Meade, published in March 1981 FORSCOM Facilities Energy Plan Summary.

3/ Note that Fort Meade's FY83 goal is 4.1% less than previously projected goal for FY85.

4/ FY75 SF adjusted by FORSCOM.

# ECIP PROJECT STATUS 15 MAR 83

ECIP PROJECTS COMPLETED

DESCRIPTION	2	FY	INVESTMENT COST (\$000)	ANNUAL (\$000)	ANNUAL SAVINGS O)	SAVINGS BEGIN
Puilding insulation and Weatherstripping	997.300/ 997.302	76	152.0	20.0	8,009	111
Centralized Control System (EMCS)	997.304	91.	727.0	124.5*	36,743	ж
Install Floor and Ceiling Insulation	997.306 (219)	1.1	633.1	85.9	34,820	61
Storm windows and Railding Insulation	220.20	7.8	1,010.0	433.8	94,072	61.
Storm windows, weather- strip, Milding Insulation	220.22 (221)	111	991.0	. 450.6	81,010	80
Family Housing Improvements (Areas 3 and 11)	882.050	80	157.0	16.2	4, 122	82
Boiler Economizer	224	80	149.0	19.6	11,860	82
Laundry Improvements	228	. 81	368.4	139.8	14,900	82
Family Mousing Improve- ments (Areas 1, 2, 4 thru 10)	882.070	81	2,200.0	173.8	60,953	82.

TOTAL INVESTMENT TO DATE: \$ 6,387,500.

TOTAL ANNUAL SAVINGS TO DATE: \$ 1,464,200.; 339,489 MDTU

\* EMGS has been non-operational for most of the period since installation. Recently efforts have been successful in revitalizing the system. Ourrent savings are probably 501 of original projected savings.

ECIP PROJECT STATUS 15 MAR 83

	SAVINGS	#80 8#	83
	ANNUAL SAVINGS (\$000)	78,600	16, 170
RUCTION	ANNUAL (\$000)	582.3	72.4
ECTP PROJECTS UNDER CONSTRUCTION	INVESTMENT COST (\$000)	3,500.0	0.809
ECIP	F	82	82
	N.	526	882.080
	DESCRIPTION	failding Energy Retrofit	Finity Housing Arto- matic Vent Dimpers

TOTAL INVESTMENT: \$ 4, 108, 000.

TOTAL ANNUAL SAVINGS: \$ 654,700., 94,770 MBTU

FUNDING
ĕ
SUBMITTED FOR F
PROJECTS
ECIP

1,405.8 117,505 637.7 56,012 442.1 62,686				INVESTIMENT	ANNUAL	ANNUAL SAVINGS	SAVINGS
237         85         6,343.1         1,405.8         117,505         8           T-454         85         2,841.4         637.7         56,012         8           T-458         85         5,106.2         4412.1         62,686		Z	Ŧ	(\$000) LSOO	(*000	FIDIO	
T-454 85 2,841.4 637.7 56,012 T-458 85 5,106.2 4412.1 62,686	Retrofit		85	6, 343.1	1,405.8	117,505	J.R
T-4158 85 5, 106.2 4412.1 62, 686	5e 1117 -Storm		85	2,841.4	637.7	56,012	87
	sulation Insul-		85	5, 106.2	1412.1	62, 686	87

TOTAL INVESTMENT: \$ 14,290,700.

TOTAL AHRUAL SAVINGS: \$ 2,485,600., 118,698 MBTU

6.1 INCREMENT F AND G SUMMARY TABLE

F-1   Reduce Domestic Hot Water Setpoint   192   168   1,881	tic Hot Water Setpo O and 8605 + 10 Buildings	d.	PROJECT COST (\$)	INVESTMENT COST (\$)	SAVINGS (MBTU/YR)	COST SAVINGS (\$)	DISCOUNTED SAVINGS (\$)	DISCOUNTED SAVINGS(\$)	SIR	REDUCED SIR
Adjust Controls To Reduce Overheating Buildings 2239, 2246, 4411 (not accurately quantifiable) Repair Burners Building 90BH Repair Leaks, Condensate Pump Building 8605 Seal Kitchen Exhaust Damper Apartment 1837F + 100 Extrapolated Apartments Reduce Outside Air, Rebalance, Building 8605 + 10 Extrapolated Buildings Reduce Lighting Levels Building 1978 Reduce Lighting Levels Building 1978 Reduce Lighting Levels Building 1978 Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated		int	192	168	1,881	16,435	186,136	0	1,108.0	ı
Adjust Controls To Reduce Overheating Buildings 2239, 2246, 4411 (not accurately quantifiable) Repair Burners Building 90BH Repair Leaks, Condensate Pump Building 8605 Seal Kitchen Exhaust Damper Apartment 1837F + 100 Extrapolated Apartments Reduce Outside Air, Rebalance, Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Buildings Reduce Lighting Levels Building 1978 Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Building 1978 Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Building 4451 Clean Radiators, Building 4431 (Note: Not Accurately Quantifiable) Zero Energy Band Thermostats Building 370 Reduce CFM, Day/Night Time Clocks, Buildings 9801 + 3 Extrapolated Buildings 9801 + 3 Extrapolated	ation Building 8472		47	42	79	687	12,217	0	289.0	
Repair Burners Building 90BH 832 Repair Leaks, Condensate Pump Building 555 8605 Seal Kitchen Exhaust Damper Apartment 2,626 1837F + 100 Extrapolated Apartments Reduce Outside Air, Rebalance, Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Buildings 8601 + 3 Extrapolated Buildings 8601 + 3 Extrapolated	ols To Reduce Overho 39, 2246, 4411 (not uantifiable)	eating	199	178	443	3,581	42,011	0	236.0	ı
Repair Leaks, Condensate Pump Building 555 500 8605  Seal Kitchen Exhaust Damper Apartment 2,626 2,424  1837F + 100 Extrapolated Apartments Reduce Outside Air, Rebalance, Building 8605 + 10 Extrapolated Buildings Reduce Lighting Levels Building 1978 306 275  Night Setback/Setup Barracks Building 11,605 10,439 8605 + 10 Extrapolated Buildings Weatherstripping and Caulking, Doors and Windows, Buildings 2250, 4451  Clean Radiators, Building 4431 (Note: 333 300  Not Accurately Quantifiable) Zero Energy Band Thermostats Building 1,110 999  Reduce CFM, Day/Night Time Clocks, 29,304 26,254 Buildings 9801 + 3 Extrapolated	rs Building 90BH		832	749	1,144	9,978	176,017	0	234.9	ı
Seal Kitchen Exhaust Damper Apartment 1837F + 100 Extrapolated Apartments Reduce Outside Air, Rebalance, Building 8605 + 10 Extrapolated Buildings Reduce Lighting Levels Building 1978 Reduce Lighting Levels Building 1978 Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Buildings Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Buildings 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated Building 8605 + 10 Extrapolated 8605 + 10 Extrapolated 8705 Reduce CFM, Day/Night Time Clocks, 8707 Reduce CFM, Day/Night Time Clocks, 88011 + 3 Extrapolated 88011 + 3 Extrapolated	, Condensate Pump Bu	uilding	555	200	357	3,114	54,936	0	110.0	1
Reduce Outside Air, Rebalance, Building 8605 + 10 Extrapolated Buildings Reduce Lighting Levels Building 1978  Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Buildings Weatherstripping and Caulking, Doors and Windows, Buildings 2250, 4451 Clean Radiators, Building 4431 (Note: Not Accurately Quantifiable) Zero Energy Band Thermostats Building 370  Reduce CFM, Day/Night Time Clocks, Buildings 9801 + 3 Extrapolated Buildings 9801 + 3 Extrapolated	Exhaust Damper Apaı Extrapolated Apartme	rtment ents	2,626	2,424	3,376	20,301	199,778	0	82.5	ı
Reduce Lighting Levels Building 1978 306 275  Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Buildings  Weatherstripping and Caulking, Doors 18,284 16,456 and Windows, Buildings 2250, 4451  Clean Radiators, Building 4431 (Note: 333 300  Not Accurately Quantifiable)  Zero Energy Band Thermostats Building 1,110 999  Reduce CFM, Day/Night Time Clocks, 29,304 26,254  Buildings 9801 + 3 Extrapolated	de Air, Rebalance, 5 + 10 Extrapolated		6,720	6,039	4,610	29,106	324,071	18,172	53.6	ı
Night Setback/Setup Barracks Building 11,605 10,439 8605 + 10 Extrapolated Buildings Meatherstripping and Caulking, Doors and Windows, Buildings 2250, 4451 Clean Radiators, Building 4431 (Note: 333 300 Not Accurately Quantifiable)  Zero Energy Band Thermostats Building 1,110 999 870 Reduce CFM, Day/Night Time Clocks, 29,304 26,254 Buildings 9801 + 3 Extrapolated	ing Levels Building		306	275	182	811	10,728	4,152	39.0	31.8
Weatherstripping and Caulking, Doors and Windows, Buildings 2250, 4451 Clean Radiators, Building 4431 (Note: 333 300 Not Accurately Quantifiable) Zero Energy Band Thermostats Building 1,110 999 370 Reduce CFM, Day/Night Time Clocks, 29,304 26,254 Buildings 9801 + 3 Extrapolated	k/Setup Barracks Bu trapolated Buildings	ilding	11,605	10,439	2,423	21,131	239,217	0	22.9	1
Clean Radiators, Building 4431 (Note: 333 300 Not Accurately Quantifiable)  Zero Energy Band Thermostats Building 1,110 999 370  Reduce CFM, Day/Night Time Clocks, 29,304 26,254 Buildings 9801 + 3 Extrapolated	ping and Caulking, I Buildings 2250, 44	Doors 51	18,284	16,456	1,842	15,779	280,216	-2,477	17.0	î
Zero Energy Band Thermostats Building 1,110 999 370 Reduce CFM, Day/Night Time Clocks, 29,304 26,254 Buildings 9801 + 3 Extrapolated	ors, Building 4431 ly Quantifiable)	(Note:	333	300	52	312	4,278	0	14.3	1
Reduce CFM, Day/Night Time Clocks, 29,304 26,254 Buildings 9801 + 3 Extrapolated	Band Thermostats Bu	ilding	1,110	666	222	1,088	13,881	829	13.9	ı
Buldings, 9828	Day/Night Time Cloc 01 + 3 Extrapolated 828	ks,	29,304	26,254	5,370	27,623	311,232		11.8	· I
F-14 Photo Cell Exterior Lighting Building 84 75 4	xterior Lighting Bu	ilding	84	75	4	73	877	725	11.7	2.7

6.1 INCREMENT F AND G SUMMARY TABLE (Continued)

PROJECT NO.	ENERGY CONSERVATION MEASURE	TOTAL PROJECT COST (\$)	INVESTMENT COST (\$)	ANNUAL ENERGY SAVINGS (MBTU/YR)	FIRST YEAR COST SAVINGS (\$)	TOTAL DISCOUNTED SAVINGS (\$)	NON-ENERGY DISCOUNTED SAVINGS(\$)	SIR	REDUCED SIR
F-15	Weatherstripping, Garage Doors - Wing C, Building 2246	777	669	105	916	6,702	0	9.58	1
F-16	Night Setback/Setup 1837F (Boiler for Buildings 1836, 1837, 1938) + 34 Extrapolated Boilers	36,890	33,215	2,196	13,172	18,063	0	5.44	1
F-17	Reduce Air Flow To Design CFM, Rebalance Building 4432	611	549	92	231	2,568	0	4.67	ı
F-18	Reduce Outside Air, Rebalance Building 90, 4550	1,220	1,098	69	421	4,839	182	4.41	1
F-19	Energy Conserving Fluorescent Lamps, Various Buildings	43,216	38,904	9,534	41,589	160,778	73,112	4.13	3.0
F-20	Economizer Cycles, CPO Area and Redwood Cafe, Building 4432	5,772	5,195	763	1,907	21,221	0	4.09	ı
F-21	Maintenance - Unit Heater Building 2276	166	150	9	53	602	0	4.02	1
F-22	Heat Pump for Domestic Hot Water, Building 8688	1,388	1,249	15	303	3,636	3,097	2.91	0.57
F-23	Remove Vestibule Radiators Building 4551	244	210	S	32	634	0	2.88	ı
F-24	Weatherstrip Window Air Conditioning Unit Building 504	30	27	-	7	65	0	2.40	1
F-25	Modify Controls, Shut Off Outside Air on Warmup, 100%, Outside Air on Cool Down Buildings 4431, 4432	3,996	3,579	26	584	8,004	0	2.23	ı
F-26	Demand Control, Building 4272	555	200	0	120	1,090	1,090	2.18	0
F-27	Replace Incandescent Lamps with Fluorescent Lamps, Various Buildings	24,843	21,707	1,864	13,546	42,533	20,708	1.96	1.34
F-28	High Efficiency Motor Replacement Building 4217	1,354	1,219	39	139	1,896	499	1.56	1.52
									<u></u> -

6.1 INCREMENT F AND G SUMMARY TABLE (Continued)

REDUCED SIR	,	.35	ı	ı	*	*	*	*	*	ı	
SIR	1.41	1.21	1.20	1.06	*	*	*	*	*	11.74	
NON-ENERGY DISCOUNTED SAVINGS(\$)	0	376	863	0	*	*	*	*	*	121,328	
TOTAL DISCOUNTED SAVINGS (\$)	91	482	3,642	3,722	*	*	*	*	*	2,136,343	
FIRST YEAR COST SAVINGS (\$)	8	51	344	211	*	*	*	*	*	223,653	
ANNUAL ENERGY SAVINGS (MBTU/YR)	3	4	100	24	*	*	*	*	*	36,902	
INVESTMENT COST (\$)	64	400	3,027	3,497	819	131	059	75	*	181,862	
TOTAL PROJECT COST (\$)	72	444	3,362	3,885	910	145	722	84	*	202,883	
ENERGY CONSERVATION MEASURE	Ductwork Insulation Building 4551	Control Domestic Hot Water Pump Buildings 370, 4411	Solar Film Buildings 4415, 4432	Insulation, Interior Ceiling and Wall, Building 2246 Arms Room	Modify Outside Air Vent Building 4432	Seal Manhole Cover Building 4551	Modify Intake Ductwork Building 4554	Repair Barometric Damper Building 726	Electric Outlet and Switch Energy Seals	Quantifiable Grand Total	
PROJECT NO.	F-29	F-30	F-31	F-32	F-33	F-34	F-35	F-36	F-37		

\* Not Quantifiable.

6.2 INCREMENT F AND G LABOR AND MATERIAL SUMMARY

LABOR RATE	14	35	14	35	35	14	20	14	35	35	14	35	35	14
DESIGN (S)	12	ĸ	12	45	30	110	363	17	627	886	18	09	1,584	လ
(S) (S)	12	2	6	37	25	92	297	14	528	823	15	20	1,320	4
LABOR HOURS	12	34	13	12	6	101	22	20	150	265	21	14	386	m
LABOR COST (\$)	168	56	178	420	315	1,414	1,100	275	5,250	9,266	300	200	13,500	38
MATERIAL COST (\$)	0	13	0	260	150	1,010	3,960	0	4,180	5,766	0	400	10,320	30
TOTAL PROJECT COST CONSTRUCTION (\$) COST (\$)	168	42	178	749	200	2,424	6,050	275	10,450	16,473	300	1,000	26,400	75
TOTAL PROJECT COST (\$)	192	47	199	832	555	2,626	6,710	306	11,605	18,284	333	1,110	29,304	84
ENERGY CONSERVATION MEASURE	Reduce Domestic Hot Water Setpoint Buildings 370 and 8605 + 10 Extrapolated Buildings	Piping Insulation Building 8472	Adjust Controls To Reduce Overheating Buildings 2239, 2246, 4411 (not accurately quantifiable)	Repair Burners Building 90BH	Repair Leaks, Condensate Pump Building 8605	Seal Kitchen Exhaust Damper Apartment 1837F + 100 Extrapolated Apartments	Reduce Outside Air, Rebalance, Building 8605 + 10 Extrapolated Buildings	Reduce Lighting Levels Building 1978	Night Setback/Setup Barracks Building 8605 + 10 Extrapolated Buildings	Weatherstripping and Caulking, Doors and Windows, Buildings 2250, 4451	Clean Radiators, Building 4431 (Note: Not Accurately Quantifiable)	Zero Energy Band Thermostats Building 370	Reduce CFM, Day/Night Time Clocks, Buildings 9801 + 3 Extrapolated Buildings, 9828	Photo Cell Exterior Lighting Building 2793
PROJECT NO.	F-1	F-2	F-3	F-4	F-5	F-6	F-7	F-8	F-9	F-10	F-11	F-12	F-13	F-14

6.2 INCREMENT F AND G LABOR AND MATERIAL SUMMARY (Continued)

				_										
LABOR RATE	35	35	20	20	ı	35	14	35	35	14	35	35	1	35
DESIGN (\$)	42	1,995	33	99	2,333	312	6	75	14	2	216	30	1,709	73
S10H (\$)	35	1,645	28	55	1,944	260	7	63	10	1	180	25	1,424	61
LABOR HOURS	11	475	11	22	0	74	7	22	9	er!	55	7	0	6
LABOR COST (\$)	394	16,625	929	1,110	0	2,600	94	780	210	15	1,800	250	0	320
MATERIAL COST (\$)	245	13,300	0	0	38,979	2,080	45	375	10	12	1,440	200	21,710	744
CONSTRUCTION COST (\$)	700	33,250	250	1,110	38,979	5,200	150	1,250	220	27	3,600	200	21,710	1,220
TOTAL PROJECT COST CONSTRUCTION (\$)	111	36,890	611	1,220	43,216	5,772	166	1,388	244	30	3,996	555	24,843	1,354
ENERGY CONSERVATION MEASURE	Weatherstripping, Garage Doors - Wing C, Building 2246	Night Setback/Setup 1837F (Boiler for Buildings 1836, 1837, 1938) + 34 Extrapolated Boilers	Reduce Air Flow To Design CFM, Rebalance Building 4432	Reduce Outside Air, Rebalance Building 90, 4550	Energy Conserving Fluorescent Lamps, Various Buildings	Economizer Cycles, CPO Area and Redwood Cafe, Building 4432	Maintenance - Unit Heater Building 2276	Heat Pump for Domestic Hot Water, Building 8688	Remove Vestibule Radiators Building 4551	Weatherstrip Window Air Conditioning Unit Building 504	Modify Controls, Shut Off Outside Air on Warmup, 100%, Outside Air on Cool Down Buildings 4431, 4432	Demand Control, Building 4272	Replace Incandescent Lamps with Fluorescent Lamps, Various Buildings	High Efficiency Motor Replacement Building 4217
PROJECT NO.	F-15	F-16	F-17	F-18	F-19	F-20	F-21	F-22	F-23	F-24	F-25	F-26	F-27	F-28

6.2 INCREMENT F AND G LABOR AND MATERIAL SUMMARY (Continued)

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LABOR RATE	35	35	35	35	35	35	35	14					 		
DESIGN (S)	4	24	181	210	49	8	39	5							
SIOH (\$)	е	20	151	175	41	7	33	4							
LABOR HOURS	1	9	49	99	11	ю	6	e							
LABOR COST (\$)	40	200	1,705	1,969	385	105	310	42							
MATERIAL COST (\$)	20	160	1,061	1,225	340	20	290	33							
CONSTRUCTION COST (\$)	99	400	3,030	3,500	820	130	059	75	ABLE					,	
TOTAL PROJECT COST CONSTRUCTION (\$)	7.5	444	3,362	3,885	910	145	726	84	NOT QUANTIFIABLE					,	
ENERGY CONSERVATION MEASURE	Ductwork Insulation Building 4551	Control Domestic Hot Water Pump Buildings 370, 4411	Solar Film Buildings 4415, 4432	Insulation, Interior Ceiling and Wall, Building 2246 Arms Room	Modify Outside Air Vent Building 4432	Seal Manhole Cover Building 4551	Modify Intake Ductwork Building 4554	Repair Barometric Damper Building 726	Electric Outlet and Switch Energy Seals						
PROJECT NO.	F-29	F-30	F-31	F-32	F-33	F-34	F-35	F-36	F-37		-				

### 7. ENERGY PLAN

### Recommendations

Table 3.3, starting on Page ES-3.17, of this Executive Summary summarizes the costs, savings, and economics of the ECIP projects and Tables 6.1, Page ES-6.9, and Table 6.2, Page ES-6.12, of this Executive Summary summarize Increment F and G projects. Programming documents for the ECIP projects are contained in Volume 3 of the report.

It is recommended that all projects be implemented, and done so as soon as possible, in order to maximize energy savings. Priority for implementation can be established in order of decreasing SIR, with highest SIR being accomplished first. Ultimately, however, implementation should be left to the discretion of the facility, as other implementation criteria may be involved.

For the Energy Management and Control System it is recommended that: the existing CPU should be retrofit or replaced, including a manufacturer's maintenance contract; the use of Direct Digital Control be considered when constructing new buildings or altering existing buildings; the various buildings and systems served by the EMCS be analyzed for implementation of the optimum start/stop and load reset features of the system; demand control for additional buildings and systems be considered; and consideration be given to expanding the system to serve other buildings.

Projected energy savings are listed in the Summary on Page ES-4.1 of this report.

# Projected Energy Savings

Tables 4.1 through 4.4 of this Executive Summary summarize the potential energy savings. These indicate that for the Fort Meade facility there is a potential savings of 78,543 MBTU per year if all of the ECIP projects are implemented and 30,384 MBTU per year if all of the Increment F projects are implemented, with a grand total potential savings of 108,927 MBTU per year. These savings, coupled with the savings that were previously established as noted by comparing FY82 data with base year FY75 data, together with projected savings of 94,770 MBTU per year for ECIP projects under construction, indicate that the goal savings of 20% will be exceeded by 6.8% if all of the projects are implemented.

The Tables also indicate that for the NSA Buildings surveyed, and their extrapolations, there is a potential savings of 11,358 MBTU per year if the ECIP projects are implemented and 6,518 MBTU per year if the Increment F projects are implemented, with a grand total potential savings of 17,876 MBTU per year.

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